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WORLD HEALTH ORGANIZATION

In this issue

- *Hypertension is the price we pay for civilization, it has been said. But how does civilization cause hypertension ? By its stresses and strains acting directly on the walls of the blood vessels ? By its effects on haemodynamics ? Through the central nervous system ? By means of hormones released into the blood ? Each suggested explanation for essential hypertension in terms of a single factor is found to be wanting in some respect. A full discussion between scientists from both eastern and western Europe took place at a symposium on essential hypertension organized jointly at Prague by the WHO Regional Office for Europe and the Czechoslovak Cardiological Society* *(see page 363).*

- *At a conservative estimate, there are some 750 000 seafarers on ships other than those engaged in coastal trading. A WHO consultant who visited many of the principal ports of the world reports on the health problems of the seafarers and the difficulties of solving them—difficulties inherent in their unique mode of life. There have been improvements in the care of the seafarers' health, he remarks, but much remains to be done* *(see page 371).*

- *In Africa (except Egypt and South Africa) there is at present one doctor per 20 000 population. To ensure the basic health services in 1970, WHO estimates that one per 10 000 will be needed ; and the number of other health personnel will have to be increased proportionately. This will call for an enormous expansion in the education and training of all health personnel* *(see page 374).*

- *There are no obvious biological characteristics distinguishing arthropod-borne (arbor) viruses from others. A number of different tests are needed to establish —if not with certainty, at least with a high degree of probability—that a pathogenic virus belongs to this group. Its specific identity may then be established by further tests* *(see page 381).*

ESSENTIAL HYPERTENSION

" It is striking that, in approaching the roots of a disease, the disease itself frequently seems to lose its firm outlines. It decays under the touch of the scientific hand. It may even cease to exist as an entity, becoming a syndrome with varied causation or only a reaction of the individual under certain environmental conditions."

DR PAVEL LUKL *

If essential hypertension is truly a disease entity and more than a quantitative abstraction, we are still badly in need of knowledge about its mode of origin and natural history. A good deal of basic information on the definition and measurement of raised blood pressure and its association with coronary heart disease is contained in the report of a WHO Expert Committee on Hypertension and Coronary Heart Disease.[1] Its wider and more controversial aspects were recently discussed by a worldwide panel of authorities at a symposium in Prague organized jointly by the WHO Regional Office for Europe and the Czechoslovak Cardiological Society.[2]

Definitions

We are not here concerned with the purely systolic hypertension found in association with senile aortitis or the high cardiac output states of aortic regurgitation, anaemias or thyrotoxicosis. Diastolic hypertension is the essential feature; it is practically always accompanied by a raised systolic pressure and it is found in a large group of disorders. As scientific investigation has yielded more and more specific causes of hypertension in cases that would, at an earlier date, have been labelled of idiopathic origin, the concept of an " essential " form of the disease has become somewhat nebulous: difficult to define but equally difficult to deny, yet one that must in any case be regarded as an entity for working purposes. Many factors responsible for hypertension in young adults are now well recognized. They include: constriction of the aorta or its main branches, or of the renal arteries; glomerulonephritis, pyelonephritis, toxaemia of pregnancy and unilateral renal disease; lupus erythematosus and polyarteritis nodosa; and such lesions of the adrenals as primary aldosteronism, Cushing's syndrome, congenital hyperplasia and neoplasms. But in none of these cases is the resultant hypertension to be regarded as " essential ", for the raised blood pressure is only a secondary, though perhaps more obvious, manifestation. In most of these patients the underlying cause can be discovered by careful clinical examination, which should include auscultation of the aorta, measurement of the blood pressure in the arms and legs, and a search for hirsutism or other evidence of masculinization in women; by biochemical investigation of the urine, serum electrolytes, and carbohydrate tolerance; by aorto-renal arteriography; and, if finally necessary, by surgical exploration and biopsy of the kidney and adrenal gland.

When all these investigations have been made and any underlying condition excluded, we are—theoretically—left with a group of cases of " pure " essential hypertension. We are also inevitably left with the suspicion that, as our knowledge expands further, even this group will be whittled down. Among these cases, no significant cause for the raised blood pressure will have been found. Among them, if there is evidence of cardiac hypertrophy or vascular involvement of the brain, retina, kidney or heart, the disease is said to be complicated or, if such changes are rapidly progressive, malignant.

* President, Czechoslovak Cardiological Society.

[1] *Wld Hlth Org. techn. Rep. Ser.*, 1959, 168.

[2] Joint WHO-Czechoslovak Cardiological Society Symposium on the Pathogenesis of Essential Hypertension (1961) *Proceedings of the . . .*, Prague, State Medical Publishing House. The page numbers mentioned in the text of the article refer to this publication.

Not enough is known about the normal range of blood pressure, either in cross-sectional studies of populations or in longitudinal surveys of individuals through their lives. We do not know for certain whether excessive vasomotor lability associated with marked influence of the emotions on blood pressure is likely to lead eventually to hypertension—although the clinical impression that this does occur is strong. We do not know why the pressure rises with age. As the WHO Expert Committee pointed out, there is no sharp line of demarcation between normotensive and hypertensive persons; the distribution curve is a continuous one. However, at the upper and lower ends of this curve there are reasonably homogeneous groups which may be defined with some assurance. For the purposes of definition, and also—in the view of some experts (Stamler, p. 68)—very definitely for the purposes of prognosis, pressures above 160/95 mm Hg are to be regarded as abnormal and hypertensive, with particular emphasis on the diastolic figure. There is some actuarial evidence that young adults with a diastolic pressure of more than 90 mm Hg run 3-5 times the normal risk of developing hypertension and hypertensive heart disease in middle life. On this view, the figure of 90-95 mm Hg is a valuable dividing line; but in the opinion of other experts, such as Pickering (p. 43), to look for a dividing line between normal and elevated blood pressure is futile since essential hypertension is to be regarded merely as a *quantitative* deviation from the norm, not a *qualitative* deviation like infection or neoplasm. According to the latter view blood pressure studies in populations do not show two distinct groups but yield a unimodal distribution curve which becomes skewed to the right with age. As the near relatives of hypertensive patients have skewed curves even as early as the 10-19 age group, and as the rate of rise in blood pressure with age is no greater than normal in these loaded groups, Pickering concludes (*a*) that the level of the blood pressure is inherited as a graded character over its whole range from below the mean to above, being labelled " essential hypertension " when it is very much above, i.e., a quantitative deviation; (*b*) that rise of pressure with age is not inherited but is the result of environmental factors operating in a way that is poorly understood except that they seem to act through the mind.

Pickering's views are not generally accepted. To most workers essential hypertension is still a disease *sui generis*, and not just the tail end of a normal distribution curve. In studying the blood pressure in large groups, and its changes with advancing age, the important point is the fate of the young adults with (often symptomless) hypertension. In the 15-29 age group some 2%, predominantly males, show a significant rise (Fejfar, p. 33). Only two-thirds of these—aged mainly from 22 to 30—have any symptoms, and these symptoms are those of vasomotor instability and somatic expressions of anxiety. However, 20-30% also have abnormal ophthalmological findings and electro-cardiographic evidence of left ventricular hypertrophy. The great majority of these hypertensive young adults have no detectable renal or endocrine disturbance, but their family history often carries more than the normal quota of cardiovascular diseases and cerebral vascular catastrophes. The proportion of these individuals who go on to suffer from fixed hypertension in middle life is difficult to assess accurately, but it is certainly larger than among normotensives.

The epidemiological approach

There are obvious difficulties in the epidemiological study of a condition currently diagnosed as one where arterial pressure is raised above an arbitrary threshold by some cause that at present cannot be detected—a condition, too, that has to be diagnosed by a process of exclusion through a detailed clinical study of the individual. As the behaviour of arterial pressure over a period of years has never been adequately studied in a representative population, there is not even any statistical support for the basic thesis that raised arterial pressure diminishes the expectation of life. It is important for the epidemiologist always to make blood pressure measurements in the same way and under the

same conditions and, if possible, to allow for individual variation at different times; otherwise the results will not be comparable. The " casual " pressure, taken once only, is usually considerably higher than the " basal " pressure—the individual's true normal taken under standardized home or hospital conditions on successive days. This incidentally militates against using a hard and fast cut-off line in diagnosis and prognosis.

In recent years extensive surveys of blood pressure have been made in various parts of the world. All agree that young women have a lower arterial pressure than young men, and old women a higher pressure than old men; pressure increases with age faster in women than in men, and the cross-over occurs about the end of the reproductive period. There is also general agreement that racial variations exist. Blood pressure is lower in the Chinese than in Europeans and North Americans. It is higher, and rises faster with age, in negroes than in whites—that this holds good for parts of the world with very different environmental stresses suggests the existence of a responsible genetic factor in the negro. With regard to occupation and mode of life, there is some evidence—not universally accepted—that arterial pressure is lower in heavy workers and in country dwellers than in professional workers and sedentary town dwellers; as twentieth century development cannot be reversed it is the individual's reaction to stressful work, rather than the work itself, which is important in practice. A somewhat unexpected finding is that there is some factor associated with an active reproductive life—operating in both men and women—which tends to counteract the normal rise of blood pressure with age, and that hypertension is often a disease of the unmarried. Many possible explanations offer themselves; one suggested by Miasnikov (p. 114) is that human happiness may have something to do with keeping the blood pressure low.

There seems to be no correlation between blood pressure and height and only a small one between blood pressure and weight. It appears that pressure is lower in habitual smokers than in non-smokers. Actuarial insurance studies show no evidence that smoking contributes to hypertension, or any correlation between hypertension and hypercholesteraemia; but hypertensive smokers or hypertensives with a raised blood cholesterol suffer a considerably higher incidence of heart disease than other hypertensives (Stamler, p. 68). Two instances in which unexpected findings emerged from epidemiological surveys were mentioned at the symposium. In Jamaica a clear correlation was found between significant bacteriuria and elevation of the blood pressure in older women, hinting at the etiological importance of asymptomatic urinary infection (Miall, p. 88). And a report from the USA (Schroeder, p. 81), tentatively confirmed in Britain, shows a higher incidence of certified deaths from cardiovascular and cerebrovascular disease in areas where the water supply is soft than in hard water areas. This, if confirmed from other sources, might be due to a deficiency of calcium or magnesium ions in soft water; or the taking into solution of cadmium or other metals from piping by acid soft waters; or the existence of a positive preventive factor in hard water. It must be remembered, however, that we are dealing here with deaths due to atherosclerotic complications and not essential hypertension as such.

Looking at the epidemiological approach to hypertension generally, it is apparent that the epidemiologist needs clinical advice in making his surveys. It is also clear that effects which appear to be genetically determined may simply be the outcome of environmental influences common to family groups—physical surroundings, emotional background, and way of life. Great caution is necessary before concluding that elevation of the blood pressure can be truly inherited.

The central nervous system and hypertension

That emotion may raise the blood pressure is well known. The possible mechanisms include an increase of the cardiac output, or of peripheral vascular resistance, or both, and increased output of adrenal corticoids. This is a response to a threat from the environment as the individual sees it; another individual may react differently or not at all.

There is a rather common and facile assumption that hypertension is the outcome of suppressed hostility and, by corollary, less likely to develop when the emotions are allowed uninhibited expression, but this is the sort of thesis that is extremely difficult to prove. It is true that hypertension is not common in frank psychoneurotics and psychotics; and there is no doubt that it is one way in which frustrated and overburdened individuals can react to their environment —but it is only one of many ways. The implication that change of environment or—through psychotherapy—of attitude to environment might control or reverse the vascular changes is not borne out in practice. All the evidence is that, while gross psychiatric disturbance, as such, does not lead to hypertension, the environmental factor does operate through the mind in a way that may be loosely labelled psychosomatic. Group studies confirm that the poorly integrated individual whose labile vasomotor system responds sensitively to stressful situations —in either direction—is more likely than the normal individual to develop hypertension in later life (Sokolow, p. 143).

That social strains—using the words in their widest sense—can influence the development of hypertension is agreed by those who approach the matter from very different angles; by the American workers in individual psychology as well as by the Russian proponents of Pavlovian conditioning theory. As Miasnikov put it: " Hypertension is the price we pay for civilization. " This places the primary cause, or *modus operandi*, in the central nervous system and permits of many possible points of therapeutic attack. Treatment may aim at dealing with the patient's conflicts (any form of treatment is also a form of psychotherapy) or at sedation, and drugs may be used which act on the cerebral cortex at one end of the nervous pathway or on the peripheral ganglia transmitting the efferent impulses. All this does not deny the importance of renal-adrenal humoral mechanisms, but these form part of a secondary process, though the hormones concerned react in turn on the brain. However, while hypertension can be reproduced in experimental animals by conflictive conditioning, it can be obtained in totally sympathectomized animals by producing renal ischaemia under conditions in which reflex or central nervous stimulation will be ineffective.

A point of fundamental importance is the transition from nervous vasospasm, which is temporary and reversible, to the state of fixed hypertension with or without secondary changes in the various organs. What is the factor that makes for this decisive step? It is as if, at some point, the organism accepted and stabilized the raised blood pressure and abandoned the possibility of reversibility. In this sense the development of established hypertension represents a partial defeat, or retreat, for the homeostatic mechanisms of the body, which settle down at another level of control (Heymans, p. 223). Any factor that induces hypertension has first to disrupt the physiological devices which normally stabilize the blood pressure at its usual level. The most important of these devices is the baroreceptor system of signalling and control which operates from the special nerve endings sensitive to stretch in the walls of the great arteries via the medullary vasomotor centre. There is evidence that this system is " reset " in hypertension, and in one sense this is an adaptive response.

Haemodynamics and hypertension

That there is a close relation between the highest autonomic centres in the cerebral cortex and hypothalamus on the one hand and cardiovascular function on the other is generally accepted; but little is known of the details of the mechanism involved, or of the types of cardiovascular response that may be initiated from higher levels. The precise control of individual skeletal muscles by different areas of the cortex is familiar; it is now becoming apparent that the cardiovascular neuro-effector system is also highly organized and capable of differentiated nervous adjustment.

In the hypothalamus the control centres are very concentrated and experimental stimulation may produce a massive rise or fall in blood pressure through changes in the

calibre of the vessels in the skin, muscles and viscera; but the hypothalamic area is normally subsidiary to the influence of the widely scattered cortical centres which are also both inhibitory and excitatory. At both levels very important shifts and redistributions of blood flow may be initiated with very little over-all change in the blood pressure itself. It would be a mistake to regard the cerebral cortex as in any way dominating the control of blood pressure; but the cortex —which links the organism with the outside world—has a powerful and intimate action on the blood pressure mechanism. The more one studies the complexity of this mechanism the less likely does a simple neurogenic theory of hypertension appear; a mosaic of factors seems to be the background. Functional cardiovascular disturbances of central origin come and go with disturbances of emotional equilibrium; what is important, as has been pointed out earlier, is the intervention of secondary mechanisms which maintain and perpetuate these changes. If, for instance, quite intermittent peripheral vasoconstriction elicited by higher sympathetic centres leads eventually to adaptive changes in the vessel walls, we may have the beginning of a vicious circle in which subsequent vasospasm and vessel narrowing potentiate the effect of each in raising the blood pressure; and on this view the central nervous action would be that of a triggering mechanism. It does seem that once persons have had hypertension for some time, whether centrally induced or not, something happens to their vessels which maintains the condition even when the initiating factor ceases to act, and the focus of interest would then shift to changes in the vessel walls and their effect on the haemodynamics of the vascular bed.

The normal haemodynamic response to emotional stress is quite analogous to the changes during muscular exercise: vasoconstriction with rise of peripheral resistance in the skin, viscera and kidneys, and vasodilatation in the skeletal muscles, constituting a preparation for action. But in hypertensives these changes with stress, though of the same nature and magnitude, take longer to disappear than in normotensives; it is as if the rise of blood pressure in the former represented a state of fixed preparedness for severe muscular effort.

Vessel wall factors

Whatever the primary factors in hypertension may be, they all finally influence the blood pressure by changing the properties and behaviour of the vessel wall—the wall of the arteriole and its branches. These changes may be distributed generally or patchily, or with an important secondary effect on the circulation if certain sensitive areas such as the renal vessels or the carotid sinus are involved. Modifications of the enzyme systems and hormonal content of the tissues may lead to local accumulation of fluid and electrolytes in the vessel wall, changes in its viscosity and elasticity, or an increased reactivity of its smooth muscle; and so, eventually, to essential hypertension. In clinical practice blood pressure is the only measurable manifestation of arterial wall behaviour, and this brings in the concept of arteriolar " tone ". Small vessels have inherently greater tone than wider ones, for a vessel yields more to a given internal pressure the greater the ratio of its radius to the thinness of its wall (Peterson, p. 295). The wider the vessel and the thinner its wall, the more it will distend so as to nullify the effect of any rise in pressure; and the more this operates in life the less will be the heightening effect of age on blood pressure. Tone is intimately linked with elasticity and, once again, in the special arterial zones which lodge the baroreceptors the response to stretch is of first importance in the reflex maintenance of normal blood pressure—these areas are, of course, highly sensitive also to adrenergic and cholinergic stimuli or to the application of adrenaline and acetylcholine. The actual dimensional change possible in small arteries is not great: not more than 15-20% even in maximum constriction or dilatation; but the effect on resistance to blood flow varies with the fourth power of the radius, so that a two-fold change in radius produces a 16-fold change in resistance.

All this is not entirely of theoretical interest, for it leads back to the question whe-

ther hypertension is the outcome of an earlier hyper-reactivity of the vessel wall. There is, unfortunately, no simple reliable clinical test for the sort of vascular hyper-reactivity that is likely to be of etiological importance. It is a suggestive fact that the blood pressure of the children of hypertensive parents begins to diverge from the mean at or before puberty; but, while established hypertension is often, perhaps usually, preceded by transient changes, it is far from true that the majority of individuals exhibiting transient elevations of pressure will go permanently downhill. In fact, many transient hypertensives have an entirely benign prognosis and normal life expectancy.

Humoral factors

Catecholamines

A great deal has been written about the role of the catecholamines in relation to hypertension. Adrenaline and noradrenaline are such amines. The adrenal medulla secretes mainly adrenaline and a little noradrenaline; the adrenergic nerves produce noradrenaline almost exclusively. It is interesting to note that adrenaline is formed mostly in response to mental tension while noradrenaline is produced under physical strain. The two compounds are found in quite large amounts in the reticular formation of the brain stem and the hypothalamus and they exert rather different actions on the cardiovascular system. It might be thought that simple biochemical estimates of their presence in the blood and tissues could answer the question whether they are important in the pathogenesis of hypertension. However, this is not so; abnormally large amounts are detectably produced only in such rare conditions as adrenal phaeochromocytoma; but it must be remembered that normal blood levels of these amines are perfectly consistent with highly increased rates of production and destruction, i.e., of turnover. They are almost certainly formed locally in the brain and elsewhere, but their action following *in situ* synthesis may differ from their general action: e.g., adrenaline widely diffused by intravenous injection causes a marked vasopressor response which is not duplicated by direct injection into a cerebral artery.

Various enzyme systems essential to catecholamine metabolism can be inhibited by certain agents and this may be of importance both in relation to natural variations in the occurrence of hypertension and in connexion with therapeutics. That these amines are important is indicated by the fact that drugs known to be amine antagonists have proved highly useful in treatment. Reserpine depletes the tissue stock of amines so that they disappear from the brain and peripheral adrenergic nerves—a sort of chemical sympathectomy—and chlorpromazine also antagonizes both their central and peripheral effects. However, it is doubtful if the sympathetic nervous system taken together with catecholamine output is more than only one factor responsible for hypertension. There is no evidence of greatly increased amine formation in any stage of hypertension in man and attempts to measure the role of the central nervous system in the causation of the disease by estimating the urinary catecholamines under various conditions of stress have been unsuccessful. But they must play some part; it may be that so far the biochemical search for these factors in hypertension has been conducted too late in the disease and that they are more important in the initial pre-hypertensive stage, after which other (probably vascular) factors perpetuate the process.

Adrenal cortex

The main advocate of the importance of the adrenal cortical hormones in connexion with hypertension and other diseases has been Selye, and his concept of " diseases of adaptation " is well known. This postulates that various stresses influence different organs by provoking—via the pituitary/adrenal axis—an increased output of cortical hormones (Selye p. 361). This is, of course, a purely experimental concept and great caution must be exercised in applying to man the results of experiments with the rat, an animal prone to develop hypertension in abnormal conditions. The experimental administration of various mineralocorticoids certainly excites a variety

of pathological changes, including hyaline degeneration and necrosis of the arterioles; and Selye believes that the particular "target" organ is determined by factors which include the diet, previous conditioning and available electrolytes. On this basis essential hypertension might be considered a disease of adaptation, but it must be repeated that it is doubtful whether this experimental model of a disease has any exact counterpart in clinical practice. Apart from the well-known association of hypertension with primary aldosteronism, neither aldosterone nor any other cortical hormone has been proved to be of any significance in the etiology of essential hypertension in man. Some authorities go so far as to deny the adrenal cortex any great importance at all in this disorder; but it may be concerned at the late stage when local damage to the vessel walls has become a prominent feature of the malignant phase of the disease.

Reno-humoral factors

Two alternative theories about the origin of essential hypertension have long held the field: the one, already discussed, postulates a neurogenic mechanism; the other a reno-humoral mechanism. It is a quarter of a century since Goldblatt's historic production of hypertension in experimental animals by clamping both renal arteries; but what then seemed the path to a final solution has led, after an immense amount of work, to disappointment and confusion. That the primary factor in hypertension is renal disease, and particularly renal vascular disease, remains unproved; and yet most workers agree that the kidney is involved at some stage in the process—but it is not known at what stage and whether primacy is to be attached to the renal factor. Some would still place it first, others secondary to the neurogenic factor. In fact, the relationship in time between hypertension and sclerosis of the renal vessels is as disputed as the older conundrum about the temporal relationship of the chicken and the egg. There is plenty of evidence that *both* may come first and it is difficult to prove which predominates in the early stage of the disease, though it is hardly deniable that, once severe hypertension is established, grave changes in kidney function are usual.

The reversibility of experimentally induced renal hypertension suggests a provocative humoral mechanism residing in the kidney and rules out any irreversible extrarenal factor such as vascular degeneration. And this applies in some instances also to man. If a healthy kidney from an identical twin is transplanted into a hypertensive individual with chronic nephritis the blood pressure promptly falls to normal, and remains normal, provided the diseased kidneys are removed. This cannot be taken to imply that ordinary clinical essential hypertension is also due to a reversible metabolic factor of renal origin; and yet, in their fixed stages, there is no distinction whatever between the features of hypertension of renal or of idiopathic origin. This suggests that, while there may be several modes of origin of acute hypertension, chronic hypertension has an individual mechanism of its own which operates irrespective of the initiating factor. It has been clearly shown that experimentally induced hypertension will cause changes in the normal kidney which enable that organ, alone, to maintain a steady elevation of blood pressure. Does this have any bearing on the genesis of fixed essential hypertension? The latter is usually a disease of advancing years. Its final phase is often preceded by a long period of labile intermittent hypertension, possibly neurogenic. Perhaps this indicates that transient hypertension is due to a genetically determined hyper-reactivity of the renal arteries, and that the kidney, once so stimulated, settles down to provoke some extrarenal factor which influences vascular tone. The maintenance of an abnormally increased arteriolar tone independent of autonomic control appears to be the basic lesion in hypertension; and it has some relation with salt and water metabolism, for either a high salt diet or an intact adrenal cortex is essential to the development of hypertension in animals whose kidneys have been tampered with.

As to the possible humoral factors involved, most research has dealt with renin

and angiotensin. Angiotensin is by no means a hypothetical substance and its administration to man produces a marked rise of blood pressure. Renin is less easily demonstrable; it is defined as an enzyme capable of converting a plasma substrate to angiotensin and is usually measured indirectly in virtue of this capacity. But there are confused and conflicting claims about the identification and importance of the renin-angiotensin system in clinical hypertension; and venous blood from the kidneys even in severe cases contains no demonstrable renin. The situation is far from clear, not because there is a paucity of clues—the reverse is the case—but because the arrows point in too many directions.

Conclusions

There may at first sight appear to be a considerable gap between the clinical and experimental aspects of hypertension—detailed and controversial as they are—and the wider sociological and epidemiological aspects with which WHO is concerned. In fact, the two approaches are complementary. Few, if any, public health subjects are of greater importance. It is a commonplace that, as standards of life improve, cardiovascular disease (bracketing coronary disease with hypertension) takes pride of place with accidents and neoplastic disease as a cause of morbidity in adult life. It may be of importance too in the less developed countries, but little is known about this. It is responsible for a great part of the premature deaths of middle age, and WHO has always attached great importance to the study of these conditions. In 1955 and 1957 study groups met to consider the problems of atherosclerosis and ischaemic heart disease, and they were followed in 1958 by the Expert Committee on Hypertension and Coronary Heart Disease. At present it is difficult to assess the relative importance of the two conditions as the data available from individual countries are not always comparable. That is why the Committee recommended world studies on community and social groups. WHO has the ability to co-ordinate such field projects, to provide or train the research workers required, and so assure some uniformity of methods for purposes of comparison. Further, WHO can bring together physicians, psychologists, sociologists and others from a variety of countries to combine their different approaches to the subject.

The value of such epidemiological work can be more clearly seen in the light of the discussion at the Prague symposium. Such work may well tend to confirm the suspected roles of emotional stress and a sedentary life in the etiology of essential hypertension; although, as with carcinoma of the lung and smoking, the clearest indications as to pathogenesis may not suffice to lead to prophylactic action. For this there is required a change in the climate of opinion and a modification of living conditions that twentieth century man may not be prepared to accept. At the same time, however, such studies—even if unable to modify basic factors—may point to ways of combating the peripheral mechanisms involved in this disease. The situation is comparable to the problem of infection in overcrowded and undernourished communities where much may be done by the use of antibiotics although the environment is left untouched. It is not beyond possibility that epidemiological demonstrations of the differing social or geographical incidence of hypertension may succeed in pinpointing environmental factors of importance, and this could lead to prophylactic public health measures of great value. It is the areas where the socio-epidemiological and clinical disciplines overlap which are most likely to prove fruitful in the future treatment and prevention of hypertension.

THE HEALTH OF SEAFARERS

The total number of seafarers on ships other than those engaged in coastal trading is—at a conservative estimate—in the region of 750 000. They form a definite community whose members are linked together by mutual interest—and health hazards—at least as closely as they are linked to their parent countries. Although much has already been done to improve their working conditions and health standards,[1] much remains to be done. In 1959 WHO undertook a study of the whole problem of the health of seafarers. As a preliminary fact-finding step the WHO Regional Office for Europe convened a conference on the subject (Marseilles, 1959), at which it became clear that not enough was known of the health problems of seafarers or of the health services available to them. Following this conference a questionnaire was drawn up by WHO in consultation with ILO and circulated to Member States. The next step was to appoint a consultant to visit some of the major ports to analyse the problem in those where services were already in being and to supplement, where necessary, the information given in the replies to the questionnaire. The ports visited were Liverpool, London, Marseilles, Athens, Alexandria, Bombay, Singapore, Manila, Hong Kong, Tokyo, San Francisco, Montreal, Helsinki, Gothenburg and Hamburg.

The findings of this investigation [2] were reported to a Joint ILO/WHO Committee on Hygiene of Seafarers that met in Geneva from 1 to 4 May 1961, and are summarized below.

Nature and extent of the health problems of seafarers

As many countries make no detailed returns of the number of workers engaged, the size of the seafaring population is not accurately known. Morbidity statistics are also in general rarely reliable, though there seems to be general agreement that certain complaints occur more often than others, i.e., diseases of the gastro-intestinal tract, cardiovascular diseases, skin diseases, mental disorders, venereal diseases, tuberculosis and dental complaints. The accident rate is also high. However, owing to the lack of comparative morbidity statistics, it is rather difficult to ascertain whether accidents and the diseases just mentioned occur more frequently among seamen than among male groups with the same age distribution in the general population. Also there is some national bias in disease incidence, as might be expected: venereal disease and tuberculosis remain common causes of incapacity in some of the developing countries, whereas mental disorders are more common in some of the developed countries. The number of seafarers who become incapacitated and are unable to return to sea is small, because many who develop an illness at sea leave seafaring for positions on shore.

There is little information on the number of deaths occurring among seafarers, but from the returns available accidents seem to be the commonest cause, accounting for over 50% of all deaths in the merchant service in some countries.

Health services available to seafarers

Medical examinations

There is a distinction between pre-registration and pre-engagement examinations. The pre-registration examination is necessary before a man can be admitted to the seamen's register; it is usually conducted by a medical officer appointed by the government or another disinterested body; and the cost is borne by the authority. The pre-engagement examination is required just before taking up duty; it is usually conducted by the medical officer of the shipping company concerned and the cost is borne by the company, except in Germany and Finland where the men themselves pay the cost. Thus the pre-

[1] See *WHO Chronicle*, 1959, 13, 111.

[2] Unpublished working document MHO/PA/45.61.

registration examination will usually be held in the country of origin, while the pre-engagement examination may be held in a foreign port. A few countries insist on both examinations in all cases, but in most only the pre-engagement examination is essential, and occasionally no medical examination of any kind is required. Where examination is compulsory radiography of the chest is usual; some countries also insist on routine serological examination of the blood. In most cases there is a recognized right of appeal against the findings of the medical examiner; it is desirable—but not universal—that such appeals should be heard by a governmental or municipal committee and not by an interested body. The findings of all these examinations are rarely recorded in a form suitable for analysis.

Health services ashore

In certain countries there are no special hospital or clinic facilities at all for seafarers ashore. In these countries seafarers are referred to the general hospital or private medical care facilities available to the public. In the United Kingdom, Norway and Sweden there are a few special clinics and hospitals based on a few major ports and organized by the shipping companies and local authorities acting separately or in conjunction. Finally, there are a few countries which provide free medical care for seafarers as a special class; in the USA and Canada through the public health service, in Israel by a private company, in Japan by the Seamen's Insurance Association. But, in all cases, continuity of treatment as from port to ship or from one port to another is poor.

Although the services of most shore hospitals are readily available to seamen, very few grant any priority in admission and treatment. But the provision of special hospitals, or even of special wards in general hospitals, is probably unnecessary and undesirable so long as the particular and urgent nature of the seafarers' needs is understood. In some ports a sick seaman can be seen by a doctor by arrangement with the local shipping agents, or referred to a port hospital. He may or may not remain a charge on the owners while he is ill, but he has the same right of access to medical care as the local population; which means, of course, that in some countries he will have to pay for his care himself.

Health services aboard

Some governments have no definite regulations regarding the provision of a ship's doctor. Most stipulate a physician if there are more than 100 persons aboard, many a nurse or nurses also if passengers and crew exceed a given number. A few countries require a doctor even for less than 100 persons. When, for any reason, no physician is available, medical care is provided by the master or chief officer, occasionally by another designated officer or by a nurse; in many countries the responsible individual is given special training for the work, though such training is not always of a very high standard. The ships of most countries must carry a medical guide and a medical chest, but the standards of equipment and inspection are sometimes inadequate.

Health insurance

At one extreme, there are states where there is no form of health insurance, either for the general public or the seafarer; at the other, health insurance is included in a comprehensive national scheme. In some cases there are special compulsory arrangements for seafarers. Such schemes of insurance as exist may or may not cover men who are overseas, and may or may not include non-residents and foreigners. In most cases the shipowner has an obligation to bring back to his port of origin any sailor taken ill aboard or abroad, and is responsible for his care and wages during the process.

Future prospects

Despite the defects reported and the apparent chaos of national regulations and facilities, much has already been done to ensure certain minimum standards. A great deal of very useful work is done by the Red Cross and other voluntary bodies and by the shipping industry itself.

Several conventions and recommendations concerning the health of seafarers have been

established by ILO. These deal with medical examinations, medicine chests, medical advice by radio at sea, social security, sickness insurance, etc., and can be extremely helpful to countries developing their health services for seafarers. However, it should be remembered that not all these conventions and recommendations have been universally adopted or fully implemented where they have been adopted.

This raises the question whether a specialized health service for seafarers ought to be brought into existence. Although there are obvious arguments for and against such a project, the balance would seem to be in favour because so far the seafarer, intermittently or continually in transit, has no firm place in the health services of home or foreign ports and because, above all, he has no real continuity of medical treatment. If such a service were to be developed, it would fare best as a joint enterprise of governments and shipping industries on a national basis. There is certainly a strong case for special health centres at the ports which would carry out all routine examinations and minor treatment, advise on welfare matters, and inspect ships' medical facilities. They could also supervise the training of staff. This would, in time, help to build up a body of medical and ancillary staff in good liaison with local clinic and hospital facilities and capable of developing more useful medical records.

A good deal can be done towards the prevention of injuries and disease on board ship. Attention to design and to lighting at strategic points will help to limit accidents; instruction in the composition and preparation of food is important to prevent gastro-intestinal disease; and periodic medical reviews have their place in the prophylaxis of mental illness, dental disease, venereal disease and tuberculosis. It seems obvious that the general training of seafarers should include ordinary prophylactic health measures; but they are hardly likely to be insisted upon while even general seagoing training is, as yet, rarely compulsory. For actual treatment aboard, where no doctor is carried, it would seem better to rely on a member of the crew specially trained as the equivalent of a naval sick berth attendant who would double medical care with other duties, rather than leave the work to the master or designated officer. A co-ordinated scheme incorporating the use of the three existing medical facilities at sea, i.e., medicine chests, medical guides, and medical advice by radio, would undoubtedly facilitate the task of this attendant and improve the quality of the care he provides.

The development of a system to produce reliable statistical data to fill existing gaps in the morbidity and mortality statistics on seafarers would be helpful in deciding what type of medical organization should be set up for them on an international basis.

A final question is that of the hazards on nuclear-powered ships. There are few of these vessels in commission at present but there will be many more. The particular point at issue here is not the danger from discharge of radioactive material, or the danger to the public from a major accident, but the specific risks to the crew. It is obviously essential to have a skilled man acting as radioactivity monitor, and protective clothing (and some emergency training) should be available to all crews. Periodic examinations for signs of radiation sickness are as necessary as at nuclear power plants ashore. All nuclear-powered ships should be very clearly marked so as to be easily identifiable in case of collision or other accident.

EDUCATION AND TRAINING OF HEALTH PERSONNEL IN AFRICA, 1960-1970 *

During the last decade, and particularly during the past two years, a number of African countries have gained their independence, and it may reasonably be expected that more independent countries will emerge in Africa in the future. All these new and emerging countries will require a health policy as part of their general social and economic plans, and must see that staff are available to carry out this policy.

On the whole, Africa [1] is under-developed in comparison with most of Europe and North America. Most of the population live at subsistence level, and have little education. Sanitary conditions are poor, the prevalence of infectious disease high. Economic development, in which the local population has played only a minor part, has so far been confined to limited areas. While no African country or territory is wholly without health services, most of them have so far concentrated on a few major health problems and on the curative side of medical work (though even this has been largely confined to urban and semi-urban areas). Until recently, senior posts in the health services of all but a few African countries and territories were filled mainly by medical personnel from abroad. With the increase in the number of independent countries, this situation is rapidly changing, and there is an urgent need for the education and training of local health personnel at all levels.

Health personnel requirements

In estimating the health personnel requirements for Africa in the period 1960-1970, the Province of Egypt (United Arab Republic), and the Republic of South Africa have not been taken into account. The Province of Egypt has 8252 physicians (1957 figure), or one physician per 2900 population, while the Republic of South Africa has 7498 physicians (1958 figure), or one per 1900 population; both these figures are well over what must be considered for the time being as a realistic minimum for the countries of Africa.

The situation for the rest of Africa is summarized in Table 1. It should, however, be noted that, while the figures in this table are based on the latest information available, this information was not always available for the same year for every country and territory. It was not possible to obtain information on all categories of personnel, and the number of sanitarians, assistant pharmacists, and laboratory technicians could only be estimated approximately. It is clear from this table that the number of health personnel for all catego-

TABLE 1. MEDICAL AND PARAMEDICAL PERSONNEL IN AFRICA,* 1960

Category	Total number of personnel	Ratio to population [a]
Physicians	9 869	1/20 204
Dentists	1 667	1/170 860
Pharmacists	2 647	1/75 300
Nursing personnel [b]	47 399	1/4 200
Medical auxiliaries	1 377	1/142 000

* Excluding Province of Egypt (United Arab Republic) and Union (now Republic) of South Africa.

[a] Estimated population: 199 400 000.

[b] Includes nurses, assistant nurses, midwives and assistant midwives.

* Based on two unpublished working papers (UNESCO/EDAF/S/6 and UNESCO/EDAF/S/7) prepared by WHO for the Conference of African States on the Development of Education in Africa, held jointly by UNESCO and the United Nations Economic Commission for Africa (ECA) in Addis Ababa, Ethiopia, from 15 to 25 May 1961.

[1] In this article, "Africa" is used in the strictly geographical sense, to mean the continent as a whole and not just the African Region of WHO.

TABLE 2. ESTIMATED MINIMUM HEALTH PERSONNEL REQUIREMENTS IN AFRICA, 1960-1970

	Category	General education (years)	Technical education (years)	Inhabitants per member of health personnel
I	Physicians	12	6	10 000
	Dentists	12	5	30 000
	Pharmacists	12	5	50 000
	Engineers	12	5	1 000 000
II	Medical auxiliaries	9-10	3	6 000
	Sanitarians	9-10	3	15 000
	Nurses and nurse-midwives	9	3+2	5 000
	Laboratory technicians	9	2	5 000
III	Nurse and midwife aides	6	2	5 000
	Sanitarian assistants	6	2	5 000
	Assistant pharmacists	6	1-2	50 000

ries listed is not enough to provide minimum health services.

Minimum requirements for the years 1960-1970, as estimated by WHO, are set out in Table 2, which also indicates the extent of the basic and technical education needed for each category of health worker.

In Africa, as elsewhere, local needs can best be met by health units. While in certain Asian countries the local health unit has been based on the ratio of 1 doctor to 60 000 population, this ratio is considered quite inadequate for

TABLE 3. ESTIMATED NUMBERS OF HEALTH PERSONNEL NEEDED IN AFRICA, 1960-1970

Estimated population (in millions)	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
	199.4	203.2	207.0	210.9	215.0	219.0	223.2	227.4	231.8	236.2	240.7
Doctors	19 940	20 320	20 700	21 090	21 500	21 900	22 320	22 740	23 180	23 620	24 070
Dentists	6 647	6 773	6 900	7 030	7 166	7 300	7 440	7 580	7 726	7 873	8 023
Pharmacists	3 988	4 064	4 140	4 218	4 300	4 380	4 464	4 548	4 636	4 724	4 814
Engineers	199	203	207	211	215	219	223	227	232	236	241
Medical auxiliaries	33 233	33 866	34 500	35 150	35 833	36 500	37 200	37 900	38 633	39 367	40 117
Sanitarians	13 293	13 547	13 800	14 060	14 333	14 600	14 880	15 160	15 453	15 747	16 047
Nurses and nurse-midwives	39 880	40 640	41 400	42 180	43 000	43 800	44 640	45 480	46 360	47 240	48 140
Laboratory technicians	39 880	40 640	41 400	42 180	43 000	43 800	44 640	45 480	46 360	47 240	48 140
Nurse and midwife aides	39 880	40 640	41 400	42 180	43 000	43 800	44 640	45 480	46 360	47 240	48 140
Sanitarian assistants	39 880	40 640	41 400	42 180	43 000	43 800	44 640	45 480	46 360	47 240	48 140
Assistant pharmacists	3 988	4 064	4 140	4 218	4 300	4 380	4 464	4 548	4 636	4 724	4 814

Africa, where the average population density is much lower than in most parts of Asia. The requirements for Africa have therefore been calculated on the basis of one health unit under a doctor for every 25 000 inhabitants. It is estimated that for every five or six such local units there should be a medical-surgical unit employing at least 2 doctors, and that for each million inhabitants there should be a regional hospital employing 8-10 doctors, as well as 3 doctors to deal with administrative matters and the general public health services.

At the central level—i.e., for approximately every 5 000 000 inhabitants—hospital administration and various specialist services will require 40-50 doctors. Allowing for some 50 private physicians in addition, needs at all levels come to roughly 400 doctors per 5 000 000 population, or 1 per 12 500. The 1970 goal has been set at one doctor per 10 000 population, since once services are available they tend to be used by more and more people, and the need for personnel increases correspondingly.

A similar procedure has been used to determine the number of other staff required. Nursing personnel (all categories) have been calculated at the rate of 4 per doctor.

Table 3 shows the year-by-year requirements for the various categories of medical personnel on the assumption that in 1960 the population/personnel ratio for each category already answered the minimum requirements estimated for 1970. This has been done in order to show the increase in personnel required to maintain the ratio as population increases.

Table 4 is an estimate of the number of graduates from the various technical and professional schools required to fill the posts foreseen for 1970. These target figures can be met only if a sufficient number of candidates come forward for the necessary education and training each year. The estimated number of candidates and their educational requirements are set out in Table 5.

It should be emphasized that the ratios given in these estimates represent no more than the minimum requirements, and their attainment could be considered only as a first step towards the provision of adequate health services.

General education

A serious handicap in the training of health personnel in Africa is the shortage of students with an adequate educational background. This is particularly apparent with medical students.

In estimating health personnel requirements in Africa for the next ten years, WHO has constantly borne in mind the necessity for co-ordinating the planning of medical training programmes with secondary and premedical education.

Care must be taken not to let future technical requirements influence the general aims of primary and secondary education unduly, nor should a bias be established in the schools in favour of one or other field of further vocational or technical training. The general educational curriculum can, however, accommodate certain subjects that will at the same time strengthen it and help prepare pupils for future, more specialized, training.

Health education can be usefully given at all levels of the school curriculum, and suggestions about suitable programmes and methods in schools have been made jointly by WHO and UNESCO. As well as helping to acquaint pupils with the elementary problems of health and disease, health education may encourage some of them to train for one or other of the health professions. It would be useful if the essential elements of health teaching could be correlated with such subjects as human biology.

Stress might be laid on certain subjects as a foundation for more advanced studies. In view of the international nature of the medical and other sciences, the secondary school curriculum should include at least one internationally used second language (e.g., English, French, Spanish, or Russian). Latin is required for entrance into the medical faculty in many countries, and it would be superfluous to enlarge upon its usefulness. On the other hand, in several countries Latin has not been required from medical students and this does not seem to have had any serious effect on

TABLE 4. ESTIMATED NUMBERS OF GRADUATES IN THE VARIOUS CATEGORIES OF HEALTH PERSONNEL NEEDED IN AFRICA, 1960-1970

Category	Number in 1960	Ratio to population	Minimum ratio required	Number required by 1970	Number of new graduates required, 1960-1970
Physicians	9 869	1/20 000	1/10 000	24 070	± 13 000
Dentists	1 167	1/740 000	1/30 000	8 023	± 6 850
Pharmacists	2 647	1/75 000	1/50 000	4 801	± 3 850
Sanitary engineers	—	—	1/1 000 000	240	± 240
Total professional personnel	13 683	—	—	37 134	± 23 940
Nurses and midwives [a]	4 330	1/46 000	1/5 000	48 140	± 44 000
Nurse aides [a]	43 069	1/4 600	1/5 000	48 140	± 5 000
Total nursing personnel [b]	47 399	—	—	96 280	± 49 000
Sanitarians	—	—	1/15 000	16 046	± 16 000
Medical auxiliaries [c]	1 377	1/142 000	1/6 000	40 166	± 38 500
Laboratory technicians [d]	—	—	1/5 000	48 120	± 30 000
Total subprofessional personnel	—	—	—	104 332	± 84 500
Sanitarian assistants	—	—	1/5 000	48 140	± 48 140
Assistant pharmacists	—	—	1/50 000	4 800	± 4 800
Total	—	—	—	52 940	± 52 940

[a] In reports from some countries no distinction is made between nurses and nurse aides. It is probable, therefore, that the number of graduate nurses is somewhat higher and the number of nurse aides correspondingly lower.

[b] In some French-speaking countries the term "*infirmier*" is used to denote both "nurse" and "medical auxiliary". It is probable, therefore, that the number of nurses and nurse aides is somewhat lower than the figure given here.

[c] The number of medical auxiliaries at present is probably somewhat higher than the figure given here (see footnote *b*).

[d] The number of laboratory technicians at present is not known. It is unlikely that it exceeds 10 000-15 000, even including the large number of untrained technicians.

TABLE 5. TRAINING OF MEDICAL AND AUXILIARY PERSONNEL IN AFRICA, 1960-1970

Category	Basic education (in years)	Number of graduates by 1970	Percentage of failures during training	Number of applicants to be recruited in 10 years	Yearly average
Physicians, dentists, pharmacists, and sanitary engineers	12	23 940	40	40 000	4 000
Nursing personnel	6-9	49 000	30	70 000	7 000
Sanitarians, medical auxiliaries, and laboratory technicians	9	84 500	25	112 000	11 200
Sanitarian assistants, and assistant pharmacists	6	52 940	20	66 170	6 617

their studies. However, this matter should be considered primarily from the standpoint of education in general.

In countries at all levels of general development, concern is often expressed about the inadequate knowledge of the basic sciences shown by the average freshman medical student. To remedy this deficiency, several countries have introduced intermediate studies of one or more years' duration as a prerequisite for admission to the professional schools. These studies usually include biology, chemistry, physics, some mathematics, and sometimes the rudiments of psychology and sociology and a foreign language. In other countries, these subjects are included in the medical curriculum proper and are given in the first year of medical studies, but even this system does not really solve the problem or relieve pre-university educators of the responsibility for preparing their pupils for higher studies.

An elementary knowledge of general biology, botany, zoology, mineralogy, physics and chemistry, and a limited but solid acquaintance with mathematics, including statistics, should be acquired in the stage preceding medical studies. The fundamentals of psychology, philosophy and logic—subjects which can be extremely helpful in medical and related studies—could also be usefully included in the curriculum.

In general, the pupil's grounding in the sciences should develop his ability to make observations, draw conclusions, and assimilate knowledge. This, together with an understanding of moral and social values, would be a good preparation not only for medical studies but also for self-development and citizenship. A sound and balanced general education would also permit the pupil to be better aware of his own capacities and real interests and help him in the choice of his future career.

Medical education

Apart from the possibility of using medical auxiliaries (which will be discussed later on). the countries of Africa have a choice of two solutions to the problem of the shortage of physicians: (*a*) importing doctors from abroad; (*b*) training their own doctors. The first solution is expensive and only to be recommended in emergency situations and when the imported doctors can also be used as teachers. The training of indigenous doctors is therefore of the utmost urgency.

While there can be no question of lowering standards of medical education in Africa, the emphasis on individual subjects in the medical curriculum might be somewhat modified for African students. In particular, the preventive and public health aspects of medicine should be emphasized.

There is no doubt that the absence of a common language in Africa presents a major difficulty in education and training (the importance of knowing an internationally used second language has already been referred to in connexion with general education). While some of the African languages are used over wide areas, none is sufficiently developed to be employed in higher education. Existing medical schools therefore use English or French in their courses for the moment, though it is not forgotten that it is the local languages that will be used in contacts with patients.

Table 6 lists medical schools in Africa (outside the Province of Egypt and the Republic of South Africa) teaching in English or French. The facilities of these schools are not being fully used, and the reasons for this need to be studied. Considerations of prestige and personal preference undoubtedly persuade many African medical students to study abroad, even though it would be better for them to be trained in the environment in which they will later have to practice.

While immediate needs may be covered to a certain extent by guiding suitable students into the vacancies for training that exist in some of the schools mentioned in Table 6, new schools must be planned and organized immediately if the demand for medical education is to be met. Otherwise it is to be feared that "accelerated" courses may spring up, graduating "doctors" with no more than an auxiliary's training. The creation of new medical schools raises a large

TABLE 6. LANGUAGES OF INSTRUCTION IN MEDICAL SCHOOLS IN AFRICA *

Country or territory	Medical school	Language of instruction
Algeria	Faculté mixte de Médecine et de Pharmacie, Algiers	French
Congo (Leopoldville)	Faculté de Médecine de l'Université du Congo, Elisabethville	French
	Faculté de Médecine de l'Université Lovanium, Leopoldville	French
Senegal	Ecole nationale de Médecine et de Pharmacie, Université de Dakar	French
Malagasy Republic	Ecole de Médecine et de Pharmacie, Tananarive	French
Nigeria	Faculty of Medicine, University College, Ibadan	English
Sudan	Faculty of Medicine, University of Khartoum, Khartoum	English
Uganda	Faculty of Medicine, Makerere College, University College of East Africa, Kampala	English

* Excluding Province of Egypt (United Arab Republic) and Republic of South Africa.

number of technical, administrative and financial problems, and WHO is studying the best means of helping governments in this matter.

Nursing education

Not only is there a serious shortage of qualified indigenous nurses in Africa, but —even more important—there is an almost complete lack of qualified and experienced indigenous teachers for the many schools of nursing and midwifery that governments are establishing or have established. Unfortunately, in a number of countries where the need for nurses is particularly urgent, there is a reluctance to allow young women to leave the shelter of their homes to be trained as nurses. However, it is expected—in the light of experience elsewhere—that this prejudice will be fairly rapidly dispelled, a probability that must be taken into account in planning for the training of male nurses. Another difficulty to be overcome is the lack of general educational facilities for women in a number of African countries.

It is particularly important that, like the African doctor, the African nurse should receive training with a public health bias. In midwifery, the main problem is to substitute trained workers for the ignorant indigenous midwives, and to persuade the population to accept this change. WHO has been working in this field in close collaboration with UNICEF.

In helping African governments to develop their nursing programmes over the next few years, WHO will lay particular emphasis on: strengthening over-all planning for the nursing service and nursing education at the national level; improving nursing service administration both in hospitals and in public health services; establishing more national and regional facilities for post-basic preparation in teaching and administration; improving basic nursing education, in particular by preparing the professional nurse for public health as well as hospital work; providing training in the supervision of auxiliary nursing and midwifery personnel.

Environmental sanitation staff

Of all health activities, environmental sanitation is perhaps the most important in Africa today. The greater part of the continent still lacks the elementary sanitary facilities that are commonly accepted as the foundation of all public health work. The incidence of the enteric diseases is still almost the same as it was ten years ago, and in many countries they come first or second among the causes of death.

The two main categories of sanitation staff are the public health engineer (or sanitary engineer) and the sanitarian (or sanitary inspector).

The public health engineer should have basic education and training in engineering, followed by at least one academic year o

specialized training, which should include adequate instruction in public health, epidemiology, health statistics, and health education of the public. This training should be given preferably in regional or national centres where the students will work in conditions approximating to those in their own countries. Only at one or two universities in Africa will it be possible to contemplate a post-graduate course in public health engineering. Indeed, with the tremendous need for civil engineers for all purposes, it is unlikely that there will be a large number of candidates for further training as public health engineers.

The sanitarian should have a background of some 10-12 years of general education, preferably to matriculation standard, before embarking on specialized training. This training normally takes about three years, and covers not only the various aspects of environmental sanitation, but also public health administration, statistics, legislation and legal procedure, and health education.

Most countries in Africa are doing their utmost to provide some sort of training for sanitarians. In some of the English-speaking countries, there are special training schools for sanitary inspectors; these usually give three-year courses to students who have completed their secondary education, i.e., who hold the general certificate of education. On completing the course, students may sit for an external examination to qualify as fully fledged sanitary inspectors. In other countries, this field has been less developed, and there is a greater variation in standards of training. If the number of sanitarians required in Africa by 1970 (about 16 000) is to be attained a special effort must be made to set up more training centres.

Training of health auxiliaries

An " auxiliary worker ", according to the definition adopted by a WHO Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel,[2] " is a technical worker in a particular field with less than full professional qualifications ".[3] The Committee adds: " The auxiliary health worker is one who may also be trained to a level of function comparable to that acceptable for professional personnel in a particular country or region."

Because of the severe shortage of professional medical and paramedical personnel in Africa, there is a great need for trained auxiliaries to serve as substitutes for qualified doctors, nurses, public health inspectors, etc. This need has long been recognized by WHO, which in the past decade has successfully promoted the large-scale training of health auxiliaries in a number of African countries and territories.

The experience of the more developed countries shows that the need for auxiliary personnel in certain fields does not diminish with an increase in professional personnel. As public health programmes expand, the need for some categories of auxiliaries may remain constant; the need for others may increase or decrease according to the development of the public health services and the ratio of professional to auxiliary personnel available for carrying out their programmes. It is important to bear this in mind when planning for the training of auxiliary workers.

A basic course for auxiliaries is particularly useful in developing countries, where the general educational level is low. The course should be given in subjects common to all branches of health work, after which trainees can go on to more specialized subjects, according to their aptitudes. Skilful and well-trained staff is needed to teach auxiliaries, and for the present may have to be imported from abroad.

Like that of doctors and nurses, the training of health auxiliaries should lay particular stress on public health work. Health education is one of the auxiliary worker's most important tasks, because he is on familiar terms with the population he serves and has many

[2] *Wld Hlth Org. techn. Rep. Ser.*, 1961, **212**, 4.

[3] An auxiliary worker has also been defined as " a paid worker in a particular technical field with less than full professional qualifications in that field who assists and is supervised by a professional worker " (United Nations, Administrative Committee on Co-ordination (1954) *Report of the ad hoc inter-agency meeting on the training of auxiliary and community workers*, p. 10 (Unpublished document Coordination/R. 170)).

opportunities of explaining basic health ideas and practices and of demonstrating them in his own way of living.

In Africa, the success or failure of health programmes may depend on teams of auxiliaries who work at some distance from their professional officer, so that supervision may be infrequent; this means that health auxiliaries must be trained to work independently.

An important question is that of advancement from the auxiliary to the professional category. There is usually a wide gap between the general educational background of the auxiliary worker and that required as a prerequisite for professional studies. In Africa, the health administrations will have to select the exceptionally talented auxiliary workers and prepare them for entrance to medical schools, giving them every assistance in the form of suitable study and leave facilities, safeguarding of pensionable service, and financial help where necessary. In the case of categories other than the physician, there are fewer difficulties and more ways of overcoming them (e.g., special entrance examinations, and permission to enter the professional school after a fixed period of service, say, five years). In this connexion, the experience of the USSR in training " medium-grade " workers—who are given parallel educational and vocational training—might usefully be applied in the developing countries in Africa. Particularly in regions where large numbers of auxiliary personnel are used, the professional staff should have guidance on how to use them.

The availability of trained auxiliaries is of the highest importance to the development of local health services in Africa and elsewhere over the next decade. Mention has already been made of WHO's special interest in this field. The training and use of health auxiliaries has been examined by two of the Organization's expert committees,[4] and a WHO inter-regional conference on the subject is being held in Africa this year.

[4] *Wld Hlth Org. techn. Rep. Ser.*, 1956, **109**; 1961, **212**.

IDENTIFICATION OF ARTHROPOD-BORNE VIRUSES

The place where the work of identifying newly isolated viruses must begin—a WHO Study Group on Arthropod-borne Viruses believes[1]—is the local or field laboratory rather than the highly specialized " reference " laboratory. Recent studies of the problem of identification therefore stress techniques that are feasible at that level, and give details of special serological tests now being developed and refined for the purpose. The steps to be followed in the identification of suspected arthropod-borne (arbor) viruses in a local or field laboratory are outlined in a paper by Casals, published in a recent issue of the WHO Bulletin.[2]

The first step, obviously, is to determine whether the virus isolated belongs to the arbor group—a determination that Casals considers perhaps the most difficult step in its identification. The serological properties according to which the arbor viruses have been classified by Casals & Brown[3] cannot be utilized here, because no serological property common to all these viruses is yet known. The only procedure that would furnish absolute proof that a virus belonged to this group would be the experimental reproduction of its natural cycle, the unique relationship of virus, vertebrate host, and arthropod vector—a clearly impracticable procedure. In the absence of this proof, Casals proposes a number of procedures and considerations that, taken together, may at least exclude most other possibilities, even

[1] *Wld Hlth Org. techn. Rep. Ser.*, 1961, **219**.

[2] *Bull. Wld Hlth Org.*, 1961, **24**, 723.

[3] Casals, J. & Brown, L. V. (1954) *J. exp. Med.*, **99**, 429.

if they cannot establish unmistakably the nature of an arbor virus.

The sources of the isolate, as well as various epidemiological and ecological considerations, may be helpful. Serial propagation of the virus when new arthropods are inoculated with it in tissue suspensions from blood-sucking arthropods is excellent evidence, since there have been no reports of such serial propagation of any but arbor viruses; however, this method requires the facilities of a specialized laboratory with colonies of suitable arthropods.

Simple serological tests such as complement fixation with known immune sera can eliminate many other viruses from consideration. The sensitivity of the isolate to inactivation by sodium desoxycholate or by ethyl ether will also provide an indication, since the arbor viruses are inactivated by these chemicals while the enteroviruses and certain others are not. Evidence of antigenic relationships with known arbor viruses justifies inclusion of a virus in the arbor group; its size or filterability, however, may exclude it and lead to its being classified instead as one of the larger viruses such as herpes.

Finally, the biological properties of the isolate either in tissue cultures or in laboratory animals may sometimes be recognized as characteristic of other viruses. Thus extensive degeneration of muscular tissue and necrosis of the interscapular brown fat in suckling mice are typical of Coxsackie viruses; and markedly higher pathogenicity for young adult mice than for newborn ones would suggest the virus of lymphocytic choriomeningitis.

Once the isolate has been clearly identified as an arthropod-borne virus, it must be placed within one of the antigenic groups and its type within the group determined if possible. Not all of the more than 100 known arbor viruses have yet been grouped according to their shared antigenic constituents, but nearly two-thirds of them are comprised in four large groups and most of the remainder in several smaller groups, so that serological relationships may reasonably be held to be a general property of the arbor viruses. The practical value of placement within one of the groups is that further comparison of the isolate to establish the type, or "species", can then be confined to other members of that group. Haemagglutinating and complement-fixing antigens prepared from the isolate are tested against known positive sera, widely cross-reactive for group determination or more specific for type determination. The results of these tests may then be checked by neutralization tests where it is deemed necessary. An immune serum against the isolate is also prepared for use in type determination.

Various ways of preparing polyvalent, or assorted, sera for each of the four major groups are described, with full details of the results of Casals' studies of the group immune response with arbor virus, following his earlier report on this basic property.[4] Since such group sera should presumably be used for rapid and simple grouping of local isolates in local laboratories, it is suggested that for this purpose they may be prepared for each group from a few selected viruses known to exist in the area.

An inexpensive and simple method of preparing the stable haemagglutinating and complement-fixing antigens required in these procedures is described, in the same issue of the Bulletin,[5] by Smith & Holt in an interim report on the fractionating, by chromatography on calcium phosphate, of arbor viruses belonging to two of the major groups. Their first results with this technique, as reported here, show that arbor viruses of these two groups, A and B, have two haemagglutinins each, and the Group B viruses have two complement-fixing antigens also; in each case, one is the virus particle. The two haemagglutinins and two complement-fixing antigens of each virus are antigenically similar but have different sedimentation properties. The evidence so far suggests that Group A arbor viruses have only one complement-fixing antigen.

In the same issue of the Bulletin, Porterfield describes[6] the results of his cross-

[4] Casals, J. (1957) *Trans. N.Y. Acad. Sci.*, Series 2, **19**, 219.
[5] *Bull. Wld Hlth Org.*, 1961, **24**, 749.
[6] *Bull. Wld Hlth Org.*, 1961, **24**, 735.

neutralization studies with Group A arbor viruses *in vitro*, using the plaque-inhibition test. No previous extensive cross-neutralization studies have been reported, perhaps because large numbers of mice were required with earlier methods. The tissue-culture techniques outlined here seem to offer an alternative approach, suggesting that some of the serological overlaps seen in the haemagglutination and haemagglutination-inhibition tests may also be detected by the more specific neutralization test. Some preliminary results of this study were reported earlier by Porterfield;[7] the present paper describes a further extension of this work and demonstrates how the technique may be used for the rapid identification of new arthropod-borne virus isolates.

[7] *Bull. Wld Hlth Org.*, 1960, **22**, 373.

RESEARCH IN MENTAL HEALTH

Knowledge of mental health is still chiefly confined to the treatment of those already ill, while " the more important areas of mental health promotion, the prevention of mental illness, and the control of socially deviant behaviour are still largely unknown territory ".[1] The reason for this, according to the WHO Expert Committee on Mental Health [2] from whose report on programme development in the mental health field this quotation is taken, is that the problems are complex, the research needed to solve them involving scientists of many disciplines, laboratories in large centres, and populations of different cultural, religious, and racial backgrounds. Further progress will require a great increase in international co-operation.

What research is needed? The Expert Committee lists a number of subjects of high priority. First, the study of brain function, requiring scientists trained in the special methods of neurochemistry and neurophysiology, and space and apparatus to be found only in well-equipped research institutes and universities. Concurrent biological, social and psychological studies should be carried out on the same group of patients by a well co-ordinated team of scientists from each of these disciplines, and the information gained, the technical problems encountered, the solutions sought and found should be made internationally known.

Research is also needed into the epidemiology of mental disorders. In this field there should (but does not) exist a standard set of terms to describe the phenomena by which a case may be defined. These descriptive terms must be translatable into several languages. Symptoms must be identified by an objective method of observation and not by intuition—by behaviour, by a simple, cheap laboratory test, or by a psychological test not dependent on education or language—, and they should be of a type that can be identified by a technical worker or " interviewer " and yield data that can be coded by a processing machine. Furthermore, the diagnostic criteria must include additional features that may be detectable by closer observation, thus permitting first a rough classification into large groups and later a finer classification.

Even if there was greater standardization of terminology, however, comparison between epidemiological studies would be difficult because there is so much variation in the approach to field studies. Consequently, there should be a formulation of key concepts by groups working intensively on pilot

[1] *Wld Hlth Org. techn. Rep. Ser.*, 1961, **223**, 39.

[2] Members of the Committee: Dr J. de Ajuriaguerra, Switzerland (Rapporteur); Sir Kenneth Cowan, United Kingdom (Rapporteur); Dr. E. Cunningham Dax, Australia; Dr R. H. Felix, USA (Chairman); Dr H. L. Harmsen, Germany; Miss I. Marwick, South Africa; Dr F. A. Quirós, Costa Rica; Dr A. V. Snezhnevsky, USSR (Vice-Chairman); Dr A. Wagdi, Province of Egypt, United Arab Republic. Representative of the United Nations (Office of the High Commissioner for Refugees): Dr H. Strotzka. Secretariat: Dr D. F. Buckle, WHO Regional Office for Europe; Dr. J. R. Ewalt, USA (Consultant); Dr E. E. Krapf, WHO (Secretary); Dr Maria Pfister, WHO; Dr J. M. Velasco Alzaga, WHO Regional Office for the Americas; Dr. L. J. Verhoestraete, WHO.

studies of a population, and international conferences should discuss these concepts and work out methods that could then be tried out in the field.

Change is characteristic of the modern world, and many of the changes undergone by society are not necessarily to its advantage. How, without undue interference with the way of life and natural development of the people, can the unacceptable or psychologically traumatic features of change be avoided? The Expert Committee felt that a first step towards an answer would be a social study of a community scheduled for industrialization. The study should lay stress on family life, individual behaviour patterns, the incidence of mental illness, and ways of dealing with deviant behaviour. It should be continued while the change to industrialization is taking place, and afterwards while the community is settling down to its new mode of life. Such a study should be made, not in one country only, but in several simultaneously, and the methodology co-ordinated internationally.

The study of personal relations within groups of patients in the hospital, between staff members, and between patients and staff has led to great changes in ward administration in some North American and European hospitals. Are the conclusions reached of universal validity? To find out whether they are or not, the studies need to be repeated to make sure that " group relations " are really improved in the hospital where the changes have been made—in other words, that the changes have not merely masked the old tensions, leaving them still existing but now expressed in new forms. At the same time, studies should be made in countries where the cultural pattern is different from that of North America and Europe, to see whether the same administrative changes bring about the same alterations in the environment of the ward everywhere, and especially whether people suspicious of group endeavour can make a system based on " improved group relations " work. Here again, international co-operation is required, in the exchange of techniques, the training of research workers, and the carrying out of the projects.

Other important subjects of research are the ecology of mental illness, problems of aging, the effect of nutrition on the mental health of a population, and genetics. In the search for the many differing causes of mental illness, there is a tendency to neglect the study of the natural history of the various forms of mental disorder and deviant behaviour in their social, cultural, and climatic background. In a world where, as the general health improves, the proportion of old people in the population increases, more knowledge is needed about the physical, social, and psychological factors that contribute to the occurrence and aggravation of mental disorder in the aged. Surprisingly little research has been carried out on the relation between nutritional deficiencies and mental illness, in spite of the known effects of such deficiencies in pellagra and some forms of " alcoholic psychosis ". Studies are needed on the effect of nutrition on the course of mental illness and on the incidence and course of mental illness in populations with poor nutritional standards (with observation of whatever changes may take place as nutrition improves). Genetics too have not been the subject of much research in the field of mental health. Recent advances in this branch of knowledge could presumably contribute to psychiatric prevention and treatment, and studies on the " chemical pattern " in mental patients and their families should be undertaken.

Research is urgently needed in many other fields. On mental health promotion, for example, in which, the Expert Committee held, " not only is there a lack of knowledge on effective techniques for achieving the goal of making healthy people even healthier and of building up resistance to mental illness, but at present some of the efforts expended may have an effect contrary to that intended ". On therapy, for the " current methods for treating behaviour problems in children, and anti-social and neurotic behaviour in adults, are so time-consuming that we cannot hope to have enough psychiatrists, or their associates from other professions, to treat all those who need treatment ". Research is also needed on administration of mental health

programmes, the size of mental hospitals, the communicability of mental illness, child development, and still other subjects.

* * *

In compiling the report, the Expert Committee had before it the results of an international inquiry into what has been done and what needs to be done in the field of mental health. In addition to the section on research, the report contains a summary of WHO's mental health activities from 1949 to 1959, as well as an examination of the aims of mental health work and of ways of achieving them, followed by a discussion of psychiatric and mental health services, their organization, planning and priorities. The training of each category of mental health worker is dealt with in turn. The attitudes required in a team leader and the qualities desirable in team members are discussed. The report concludes with an assessment of the role WHO can play in future planning for mental health, by fostering international co-operation and exchange of information and by facilitating and stimulating research.

The Pilgrimage to Mecca

No quarantinable disease was notified by Saudi Arabia during the 1961 Pilgrimage to Mecca in which more than one million people took part. Dr M. G. Candau, Director-General of WHO, has congratulated the health authorities of Saudi Arabia on this achievement, at the same time stressing the continued importance of adequate vaccination regulations. Heat still remains the pilgrims' enemy, however: 194 pilgrims died of sunstroke in 1961, 377 in 1960, and 455 in 1959.

Yaws on the retreat in Asia

In Indonesia and other parts of Asia, 42 000 000 persons were examined in 1960 in the course of the campaigns against yaws undertaken with help from WHO and UNICEF. The Regional Director of UNICEF recently stated in Bangkok that all Asia is now in the last stages of the eradication of this disease.

Notes and News

Wuchereria and *Brugia* infections

In 1955, WHO undertook a long-term programme on the therapy and control of the infections caused by filarial worms of the genera *Wuchereria* and *Brugia*. It is estimated that more than 200 million people in the endemic areas—ranging round the world from Central and South America, through tropical Africa and India, to Central China and the islands of the Pacific—are infected by one or other of these worms. These filariases cause immeasurable distress and economic loss, and there is still much controversy about how they can best be controlled.

The WHO programme has confirmed the complexity of the epidemiology and pathogenesis of the filarial diseases and the difficulty of combining various methods of parasite and vector control. The many species of mosquitos that have been proved to be the vectors of *Wuchereria* and *Brugia* have very different habits, necessitating a number of different control measures. Some are widely distributed, whereas others are restricted to small areas, their presence being due to particular local conditions. Each area of filarial endemicity therefore presents a special problem. Often more than one species is involved, which means investigating all possible combinations of vectors that may exist in the area, their relative importance, and their different habits.

A WHO Expert Committee on Filariasis, which met in Geneva from 25 July to 1 August 1961, discussed these epidemiological problems, as well as the importance of animal reservoirs in spreading human filarial infections, and the possible reasons why the clinical manifestations of these infections vary in severity from one endemic area to another. Also discussed was the need for preventing the spread of filariasis during the large urbanization programmes that are being carried out in many tropical countries where *W. bancrofti* infection is transmitted by *Culex fatigans*—one of the mosquitos most difficult to control.

The Committee also reviewed recent progress in techniques for the therapy and control of the filariases, and the experience gained in the various control programmes throughout the world.

An account of the Committee's work will appear in *WHO Chronicle* at such time as its report is published.

Expert Committee on Trachoma

A WHO Expert Committee on Trachoma met at Geneva from 29 August to 4 September 1961. On the agenda were a number of items, the most important of which was the practical application of recent advances in research to the problem of trachoma control. Since the Expert Committee issued its second report,[1] cultivation of trachoma virus on the yolk sac of the chick embryo has been achieved and important advances have been made in laboratory methods of differentiating trachoma from other types of kerato-conjunctivitis that have caused confusion in the early stages of the disease. Other items included a review of the "Geneva" classification of trachoma, the definition and measurement of the relative severity of trachoma, the study and control of environmental factors favouring transmission of infection, recent advances in therapy, and the present status of immunology in trachoma.

The Committee reviewed the techniques of extending "pilot projects" to cover wider populations, and considered methods of integrating trachoma control measures into the general public health services, community development programmes, etc. Finally, the Committee examined the question of training courses for medical and auxiliary workers engaged on trachoma control programmes and suggested suitable programmes for the various non-medical assistants. The Expert Committee had before it the report to the Director-General of the Scientific Group on Trachoma Research that met in Geneva from 22 to 28 August 1961.

An account of the Committee's work will appear in *WHO Chronicle* at such time as its report is published.

[1] *Wld Hlth Org. techn. Rep, Ser.*, 1956, 106.

Joint FAO/WHO Expert Committee on Meat Hygiene

The question of residues in meat of hormones, antibiotics, insecticides and pesticides, and drugs was among those considered by a Joint FAO/WHO Expert Committee on Meat Hygiene that met in Rome from 18 to 25 September 1961.

The first report of the Joint Committee, which appeared in 1955,[1] was devoted to the public health and economic aspects of meat hygiene. Detailed consideration was given to meat-borne diseases and to the reporting and investigation of food-poisoning outbreaks traceable to meat. Abattoir hygiene, methods of slaughter, inspection of meat, and laboratory procedures used in meat hygiene were considered and recommendations made concerning the principles of hygiene to be applied. The handling and transport of meat as well as the sanitation of retail shops and restaurant kitchens were also dealt with.

At the meeting in Rome the recommendations made in the Joint Committee's first report were reviewed in the light of subsequent advances in knowledge. Other items considered were the hygiene of chilled and preserved meat and meat products, which are frequent causes of food-poisoning, and hygiene problems connected with the slaughter and dressing of poultry, which have been of increasing concern in recent years to many countries in which the poultry industry has been growing rapidly. Particular attention was given to the special problems of meat hygiene in warm countries.

The findings and recommendations of the Expert Committee will be reviewed in full in *WHO Chronicle* at such time as they are published as a joint FAO/WHO report.

Technical discussions at World Health Assembly

In the August 1961 number of *WHO Chronicle*, it was erroneously stated (p. 307) that the Executive Board of WHO had selected " Education and training of the physician for the preventive and social aspects of clinical practice " as the subject of the technical discussions to be held at the Fifteenth World Health Assembly. This subject is actually that selected for the technical discussions at the Sixteenth or Seventeenth World Health Assembly. The subject of the technical discussions at the Fifteenth World Health Assembly will be " Mental health programmes in public health planning ", and it is for these discussions that Sir Samuel Manuwa has been invited to serve as Chairman.

[1] *Wld Hlth Org. techn, Rep, Ser.*, 1955, 99.

CODEPID : new geographical index

The Epidemiological Cable Code (CODEPID) was issued by WHO in 1953 to permit the transmission by telegram of epidemiological information required under existing sanitary conventions and agreements and the International Sanitary Regulations in a form understood only by those possessing a copy of the code. It took the place of the AA Epidemiological Cable Code, originally issued by the Eastern Bureau of the League of Nations, Singapore, and reprinted by the WHO Interim Commission; this code had been in use from 1925 to 1953. The current code provides for coding and decoding of messages in French and English, and is a 5-letter code (previous codes having been 3-letter). Code is employed for transmitting epidemiological information not only for reasons of economy and accuracy but also because the information is solely for official use. Copies of CODEPID are supplied to government services, health authorities, certain national agencies, and WHO offices.

A Map Supplement to the Code was issued by WHO in 1954 to help health administrations locate places and districts mentioned in epidemiological bulletins and reports, and identify " local areas " notified as infected or free from infection under the provisions of the International Sanitary Regulations.

The first edition of CODEPID contained a geographical index of code equivalents for the names of all countries and territories and their administrative subdivisions, as well as a list of ports and airports with code equivalents. The many changes in the administrative subdivisions of countries and territories and the creation of new states during the eight years the Code has been in use have now made it necessary for WHO

to issue a revision of this index and list. An analysis of the telegrams using the Code showed that for some areas of the world more details were needed, while for others the entries concerning administrative subdivisions, towns, ports, and airports could be omitted as they were rarely used. The 1961 edition of the geographical index and list of ports and airports therefore gives no details for European countries (including the USSR), Canada, the USA, Australia and New Zealand. For practical reasons, details on continental China have also been omitted.

Polio vaccine donated to the Congo (Leopoldville)

In July 1961 an urgent request was received at WHO Headquarters, through the senior WHO adviser to the Congo (Leopoldville), for a supply of live poliovirus vaccine to control a circumscribed outbreak of poliomyelitis in that country. Just at that time the Welcome Foundation Ltd. had offered to donate up to 125 000 doses of trivalent live poliovirus vaccine free of charge, suggesting that it be used to meet urgent needs that could not be speedily met through the usual sources, and had asked WHO to forward suitable requests to the Foundation.

Immediate advantage was taken of this timely offer, arrangements by telephone making possible the dispatch of 5000 doses of vaccine by air within a few hours after receipt of the request. The Foundation has agreed to fulfil similar requests until the amount of the donation is exhausted.

Chemotherapy of cancer

Research in cancer has reached the stage where enough is known about the cell structure and growth of the cancer in relation to its site for treatment to be adapted to the individual case. Since changes in the structure of the cancer occur at the different stages of its growth, treatment should be sufficiently flexible to be able to meet each new situation.

In the past, surgery was the treatment method of choice; then, at the beginning of the twentieth century, X-ray therapy began to be used. Nowadays radical surgery is used in many forms of cancer. In most forms and particularly in the advanced stages of cancer, surgery is often combined with X-ray therapy. However, in the last twenty years the use of chemical agents in treatment has developed remarkably. It is true that chemical agents had been used before, but only externally, and while they often caused necrosis they were lacking in selectivity. The new research in chemotherapy has concentrated on acquiring knowledge of the different chemical agents and on the development of treatment with hormones.

Hormone therapy has been used in cancer of the ovary, uterus, breast, prostate, and thyroid, and in some cases has brought about complete disappearance of secondary lesions. But it often has no effect, and where it does produce an effect it often leads to only a temporary remission.

Nowadays there are many drugs that can be employed for the different forms of cancer, and it is known that in over 28% of cancers of all types chemotherapy alone, or in conjunction with some other treatment, produces good results—in lymphogranulomatoses, lympho- and reticulosarcoma, Hodgkin's disease, multiple myeloma, bone (Ewing's) tumours, malignant neoplasms of the skin (except melanoma), ovarian tumours, etc. Work has begun in some laboratories on the use of chemical agents in cancers that so far have proved less sensitive to chemotherapy, such as those of the colon, rectum, liver, and lung. Many new drugs are being produced, but at present only a limited number can be used in clinical practice. However, the important point is that it has been shown possible to develop preparations which have a selective action on cancers and which may produce lasting results.

It has become clear that no single drug can be used for all forms of cancer, so varied are they in so many respects. It follows that the immediate tasks of research into the chemotherapy of cancer are to develop new preparations for the treatment of the more common cancers (e.g., stomach, œsophagus, lungs, and uterus) and to study more intensively the use of existing preparations for the treatment of secondary lesions in combination with surgery and radiotherapy—and perhaps also chemotherapy—directed toward the primary growth.

Research on the use of antibiotics is also expanding. A number of antibiotics have been described as inhibiting the growth of experimental

tumours, but they have not been extensively used in practice, chiefly because of their toxicity. The search for non-toxic forms is progressing steadily.

Research into the chemotherapy of cancer is as yet insufficiently co-ordinated. No biological standards exist in the various countries for the testing of certain drugs apparently effective against cancer. Contact between experimental workers and chemists is insufficiently close. Histochemistry, exfoliative cytology and other special test methods are not used frequently enough in experimental chemotherapy. The study of clinical effects throughout the world has not been standardized, and it is often difficult to know what drug and what dosage are best for certain forms of cancer. There are no general recommendations on the use of chemotherapy, alone or in combination with surgery or with radiotherapy (or both).

A WHO Expert Committee on Cancer Chemotherapy met in Geneva from 18 to 22 September 1961. Its discussions covered all aspects of the subject—the chemotherapeutic agents themselves, their effectiveness alone and in combination with other forms of treatment, the development of experimental chemotherapy, clinical trials of new drugs and their assessment, and the promotion of chemotherapy in the treatment of cancer.

An account of the Committee's work will appear in the *WHO Chronicle* at such time as its report is published.

People and Places

Accidents in the domestic environment

WHO's interest in accident prevention was at first confined mainly to accidents occurring in childhood, though more recently it has been extended to road traffic accidents.[1] The Organization has now decided to make an intensive study of the causation, epidemiology, control, and prevention of accidents in the domestic environment.

Professor E. M. Backett, Professor of Social Medicine and Head of the Department of Public Health and Social Medicine, University of Aberdeen, has been appointed to undertake this study. Professor Backett was formerly Lecturer in Social Medicine, Guy's Hospital Medical School and London School of Hygiene and Tropical Medicine, and his main field of research has been in the epidemiology of accidents and chronic disease.

Vital and health statistics in West Bengal

In 1959, the Directorate of Health Services, Government of West Bengal, India, launched a programme for the development of vital and health statistics. The programme aims at improving the quality and coverage of death certification, the coding, classification, and tabulation of cause-of-death data according to internationally accepted procedures, and the central processing of vital statistics.

Dr Knut Westlund, Chief, Institute of Medical Statistics, Norway, has been assigned by WHO to advise the Directorate of Health Services on the organization of this work, and to make recommendations on the training of staff for the coding, classification and processing of statistical data.

Dr Westlund holds a Doctorate of Public Health (Epidemiology) from Johns Hopkins University, Baltimore, Md., and has extensive experience in vital and health statistics work, both in his own country and abroad. From 1955 to 1957, he was in charge of a WHO vital and health statistics project in Nagpur, India.

Anopheline resistance to insecticides

Mr J. P. J. Hamon has been appointed short-term consultant with the Division of Malaria Eradication, WHO Headquarters, to study the relationship between anopheline resistance to insecticides and the transmission of malaria, and the implications of this relationship for malaria eradication.

Mr Hamon is Chief Entomologist at the Office de la Recherche scientifique et technique Outre-Mer, Bobo-Dioulasso, Republic of Upper Volta. He is a qualified agricultural engineer with diplomas in tropical agriculture and entomology,

[1] See *WHO Chronicle*, 1961, 15, 71.

and has an international reputation as an entomologist. He has been awarded two fellowships by WHO, one in 1955 and one in 1959, and has taken part in the work of a number of WHO technical groups.

Development of public health services

Dr Frank F. Main, Chief Medical Officer, Ministry of Health, Northern Ireland, has been appointed short-term consultant in a WHO study on the " regionalization " of health services.

During the last few years, WHO has been promoting the extension and improvement of local health services, and has helped a number of governments in this task. The next step is to help Member States to plan and organize public health services for countries as a whole, the immediate problem being that of providing, at the regional or intermediate level, specialized clinical and public health facilities which will be available to the local health services. In recent years, some countries have adopted a " regionalization plan " in which the existing local health services are technically and administratively linked up with a regional public health centre providing the services of a hospital, a public health laboratory, and other specialized facilities. Dr Mann will visit three places where this system has been tried out, namely, Puerto Rico, Czechoslovakia, and Israel.

Dr Main started his career in public health in 1931, after taking his degrees in medicine and public health at Edinburgh University. He spent several years as Medical Officer of Health for the City of Perth, becoming the Senior Administrative Medical Officer, Eastern Regional Administrative Board, Perth, in 1948. Since 1954 he has occupied his present post in which he is responsible for the health services in Northern Ireland.

Leprosy control

Dr P. Laviron, of France, has been invited by the WHO Regional Office for the Eastern Mediterranean to visit Cyprus, Iran and the Lebanon and advise the Governments of these countries on leprosy control measures. In Iran, he will discuss with the Government developments in leprosy control since a previous visit.

Dr Laviron has had many years' experience of leprosy control in New Caledonia and in the area formerly known as French West Africa, where he was Chief of the Institut Marchoux in Bamako. He has already carried out assignments for WHO in Ethiopia and the Congo (Leopoldville), as well as in Iran.

Appointments to PASB

Dr Hernán Durán has been appointed coordinator of the activities of the Pan American Health Organization and the Inter-American Development Bank and assigned to the Head Office in Washington of the Pan American Sanitary Bureau (PASB), which acts as WHO Regional Office for the Americas.

Dr Durán was born in Santiago, Chile. He graduated in the Faculty of Medicine and School of Public Health of the University of Chile, where he later taught the subjects of tuberculosis and public health. He subsequently obtained a fellowship to the United Kingdom, where he studied the various social problems connected with tuberculosis. From 1953 to 1955 he was in charge of a district in the National Health Service of Chile and he organized a demonstration area for the School of Public Health of the University of Chile. Since 1955 he has been acting as PASB medical adviser attached to the Ministry of Public Health in Uruguay.

Dr Stuart Portner has been appointed Chief of Administration, PASB. He was born in Philadelphia and studied at the City College of the City of New York, New York University, and the University of Oregon. In 1941 he took his Ph.D at the University of Michigan.

Dr Portner has worked as administrator in the US Government and in FAO. Since 1952 he has been Chief of the Administrative Management and Personnel Branch, Division of Administration, PASB.

Nutrition adviser for Africa

Dr André Raba, of France, has been appointed Nutrition Adviser to the WHO Regional Office for Africa. In this capacity Dr Raba will assist governments in planning national nutrition programmes, assess needs for nutrition personnel, and organize appropriate training. He will also be responsible for the supervision and evaluation of the nutrition projects in the Region and for cooperation with other international agencies such as FAO and UNICEF, and will act as liaison

officer between the Regional Office and Headquarters on all matters related to nutrition.

A graduate of the Faculté de Médecine, Bordeaux, Dr Raba served as FAO consultant on nutrition in the Congo (Leopoldville) prior to his appointment to WHO. He spent three years in Africa working on nutritional problems, followed by two years of advanced study and research in this field at the Faculté des Sciences in Paris. He has held fellowships in nutrition from WHO and FAO.

Medical Supply Officer for Viet-Nam

As part of its policy to help governments promote their public health services, WHO has assigned Mr Elias Gordin as Medical Supply Officer with the Government of Viet-Nam. Mr Gordin will help that Government organize the storing and distribution of pharmaceutical supplies and equipment and introduce procedures for purchasing and for distributing them to the hospitals, urban and rural health centres, and other field health projects throughout the country.

Born in South Africa, Mr Gordin received his Diploma in Pharmacy at the Johannesburg Technical College. For the past 14 years he has held senior posts in the field of pharmaceutical management and administration in Cape Town, South Africa.

Insecticide testing

The Insecticides Testing Unit in Lagos (Nigeria) forms part of WHO's programme for the evaluation and testing of new insecticides. It conducts advanced field evaluations of compounds found sufficiently effective against anopheline mosquitos to warrant their possible use in operational programmes.

The immediate programme of the unit includes the evaluation of DDVP as a residual fumigant and trials of the toxicity of Baytex to mammals. Dr Peretz Bracha of Jerusalem has been appointed to the post of chemist with the unit.

Dr Bracha holds a Ph.D. in Organic Chemistry from Hebrew University, Jerusalem, where he has recently been engaged in laboratory research on insecticide synthesis and analysis.

Dental consultant for Ghana

Dr Alexander B. MacGregor, of the United Kingdom, visited Ghana early in September to investigate as a WHO short-term consultant the dental problems of that country and advise on the future development of its dental services.

Graduating first in arts and medicine, Dr MacGregor then qualified at the Royal Dental Hospital in London. He has been awarded the Mummery Research Prize of the British Dental Association, the Collyer Research Prize of the Royal Society of Medicine, and the Storer-Bennett Research Prize of the Royal Dental Hospital. During the Second World War he served as a maxillo-facial specialist in the Royal Air Force and after the war he resumed an appointment to the consulting dental staff at St Bartholomew's Hospital, London, in addition to filling consultant posts with the Maxillo-Facial Unit of Hill End Hospital and at the Royal Dental Hospital. Since 1953 he has been Professor of Dental Surgery and Director of Dental Studies at the University of Birmingham.

CARDIOVASCULAR DISEASES, WORLD HEALTH ORGANIZATION, GENEVA

Applications from suitably qualified men and women are invited for the post of Technical Assistant in the Cardiovascular Diseases unit. Duties include assistance in appraisal of literature and preparation of technical data in relation to research and other activities. A university degree or its equivalent in a biological science, ability to read, write and speak in English or French, and a good working knowledge of the other language are required. A knowledge of other languages and familiarity with statistics would be additional advantages but are not essential.

Salary : $3600 rising to $5000, tax free and with allowances.

Applications giving brief biographical data should be addressed to " VN 694 ", PERS/RSU, WHO, Palais des Nations, Geneva, Switzerland. Last date for receipt of applications is 30 October 1961. Only candidates under serious consideration will receive a reply.

Review of WHO Publications

Teaching of Psychiatry and Mental Health, by various authors, Geneva, 1961, 186 pages (*World Health Organization: Public Health Papers*, No. 9). Price: 10/–, $2.00, or Sw. fr. 6.—.

Out of every 100 children born, according to an authority [1] quoted in this new WHO publication, eight will have a mental breakdown and three will spend some part of their lives in a mental hospital. Mental diseases, with cardiovascular diseases, cancer, and the collagen diseases, are now emerging to transform the pattern of disease in the world today. Even in the less developed countries the communicable diseases, so long predominant, are beginning to lose ground, to be no longer the terrifying scourges they were in the past. And with the emergence of less clear-cut diseases the concept of disease itself has now become less clear cut; health and disease are beginning to be seen as relative conditions influenced by a person's innate or acquired ability to adapt himself to a multitude of environmental stresses.

Not only is the pattern of disease changing, but increasing specialization has led to a compartmentalization of medicine in many parts of the world, the patient being parcelled out among a variety of specialists and his needs as an individual being neglected or ignored. In reaction to this, new emphasis is being placed upon the importance of the individual, and psychiatry is coming to be regarded as a sort of leaven permeating medicine as a whole and helping it to reorientate itself towards a better awareness of the human being as a person, in whom disease may be only a passing episode and whose personality has an important influence on whatever disease he has.

Psychiatry has now developed to the stage at which it can lay claim to a place of its own alongside other branches of medicine. Its coming of age, coinciding with the decline in importance of communicable diseases, the increasing importance of mental diseases, and the reaction against compartmentalization of medicine, place it in a strategic position of the greatest significance at the present time, when there is an active movement for the reform of the medical curriculum. For—as the new WHO publication shows—there are not many parts of the world where psychiatry is given the amount of attention in the medical curriculum that the traditional subjects receive; all too often it is not allowed more than a few lectures or demonstrations, and in certain medical schools it does not receive recognition to the extent of a special examination for the student to take at the end of his studies. Clearly, at a time when it has become a subject of popular interest in the newspapers, when modern trends in medicine all lay stress upon its importance, and when advances in pharmacology and therapeutics tend to simplify treatment and give the general practitioner more time for the psychological aspects of disease, psychiatry has a strong claim to a more equitable representation on the medical curriculum.

How should psychiatry be taught? One of the authors in the new WHO publication, Tsung-yi Lin,[2] holds that it can and should be taught from a variety of standpoints: as a specialty of medicine for the treatment of the mentally ill; as an introduction to psychosomatic medicine and the psychology of the physically ill; as a part of the basic philosophy of medical education, presenting the concepts of the "whole man" and of sound doctor-patient relationships; and as a decisive factor in community health programmes, through its presentation of the individual as a member of a family, society and culture. According to another of the contributors, Matte-Blanco,[3] the aim of the teaching of psychiatry should be for the student to reach an adequate understanding of man as a person, of his needs, conflicts and complex relations with his environment; to acquire the attitudes necessary to deal with these needs and conflicts in patients and their families, especially with regard to the anxieties and problems aroused by

[1] Henderson, D. (1955) *Brit. med. J.*, **2**, 519.

[2] Tsung-yi Lin (1961) *Perspectives in the teaching of psychiatry*. In: *Teaching of psychiatry and mental health*, p. 52.

[3] Matte-Blanco, I. (1961) *The place of psychiatry and mental health in medicine and the medical curriculum*. In: *Teaching of psychiatry and mental health*, p. 64.

illness; to acquire the ability to recognize the psychiatric aspects of any illness, especially those termed psychosomatic, and identify the main psychiatric disturbances; to be able to carry out simple psychotherapy; and to realize the possibilities and importance of promoting mental health.

The new WHO publication brings together a group of papers by teachers of psychiatry from various parts of the world, describing how the teaching of psychiatry and mental health care can be organized, what problems of content and method are likely to arise, and in what way the teaching should be integrated into the medical curriculum. The authors demonstrate the relationship of psychiatry and mental health to clinical medicine and the sciences of man. They examine the role of neurological studies in the teaching of psychiatry, the teaching of medical psychology and sociology, and the social character of mental disorder. There is a description of how psychiatry is taught at present in different countries (based on a questionnaire circulated by WHO) and the principles adopted in guiding its future development. Taken as a whole, this publication presents the basic arguments in favour of including more psychiatry in the medical curriculum and shows how this can be achieved.

Bulletin of the World Health Organization, 1961, Volume 25, Number 1 (pages 1-142). Price: 10/–, $2.00, or Sw.fr. 6.—.

Since its very earliest days the World Health Organization has devoted particular attention to the development of methods for the control or eradication of smallpox and has supported both laboratory research and field investigations. The importance which the Organization attaches to this subject is reflected in the large number of articles devoted to smallpox which appear in this issue of the *Bulletin of the World Health Organization*.

There has been much difference of opinion as to the significance of the different reactions to smallpox vaccination—especially the "immediate reaction"—and as to how such reactions should be classified. The author of the first article, Group Captain Cross of the Royal Air Force, has carefully investigated this problem through extensive experimental work, and he proposes a modified system of classification and recommends a standard scratch technique which is well suited to mass vaccination.

The most commonly used method for testing the potency of smallpox vaccines is the rabbit scarification technique; however, the results obtained with this method are sometimes irregular and are not easily reproduceable. Kolb and co-authors from the USA suggest improvements by which this method is rendered more precise and which ensure greater uniformity of results.

As a result of advances in tissue culture techniques interest has increased in the use of such cultures for the production of smallpox vaccines and for the titration of vaccinia virus and its antibodies. Subramanyam et al., from the Pasteur Institute of Southern India, report on the use of cell cultures from sheep kidney for the cultivation of vaccinia virus.

In the spring of 1960, the World Health Organization, jointly with a number of other bodies, sponsored a series of co-operative studies conducted in Madras, India, for the elucidation of a number of unsolved problems in the epidemiology and immunology of smallpox. Articles from India, the United Kingdom and the USA, by Kempe et al., Downie et al., Meiklejohn et al., and Hobday et al., report some of the findings reached in the course of these studies.

Previous trials had suggested that vaccinia hyperimmune gamma-globulin was effective in the prevention of smallpox, but the numbers involved in those trials were insufficient to provide satisfactory statistical evidence. New trials were therefore carried out in Madras which show that a statistically significant reduction in the incidence of smallpox in family contacts of cases can be obtained by the administration of immune gamma-globulin. While this method of prophylaxis is not perhaps applicable in, for instance, large towns where smallpox is endemic, it might well be of value in smallpox communities subject to periodic epidemics.

Another paper reports on studies on the amount of virus recovered from the saliva or garglings in relation to the stage and severity of clinical illness, confirming epidemiological observations that smallpox is not highly infectious in the febrile pre-eruptive stage.

Serological tests carried out on samples of the vaccinated population of Madras showed that approximately 10% of the sera tested had little or no neutralizing activity, despite the fact that they came from donors with good primary

vaccination scars. Antibody levels were much higher in persons who had recovered from smallpox than in successfully vaccinated persons. These results point to the necessity for periodic revaccination of an exposed population.

In the course of these Madras studies, attempts were also made to recover virus in the environment of a smallpox hospital by air sampling in order to obtain information on the amount of virus disseminated in the air by smallpox patients at various stages of their illness. Surprisingly, virus was recovered once only by the method used.

In another study, comparative tests were made between dried vaccine prepared according to the method recommended by WHO and a fresh local buffalo-calf vaccine in revaccination against smallpox. It was conclusively shown that the dried vaccine gave approximately 2½ times as many successful takes as the liquid preparation, and it is concluded that under the conditions prevailing in Madras, which are similar to those in many other tropical areas, freeze-dried vaccine is both more effective and more economical.

Differences in the clinical picture are very often insufficient to allow of differentiation between variola major and variola minor. Dumbell and co-workers describe a simple laboratory test which permits a differential diagnosis to be made within 48 hours of receipt of suitable specimens.

A number of papers have been published in the *Bulletin of the World Health Organization* during the past two years on various aspects of live virus vaccination against poliomyelitis. This issue contains a report on mass immunization with live vaccine made from Sabin strains in the USSR, where it had been administered, mainly in dragées, to nearly 77 500 000 persons by the end of 1960. Chumakov et al. conclude from their experience that, while inactivated vaccine does not fundamentally influence the epidemic process, the mass use of live vaccine can prevent poliomyelitis epidemics.

Measuring the endemicity of a disease is a problem which has long taxed the ingenuity of experts. Some years ago, an "index of endemicity" was proposed in the Bulletin,[1] and applied to cholera in India. In the report on measurement of seasonal variations in endemic cholera in West Bengal, which appears in the issue under review, Abou-Gareeb takes the idea propounded then a stage further. The same author reports in a brief note on outbreaks of cholera in Nepal during the years 1958-60. The choice between Ogawa and Inaba strains in the preparation of cholera vaccine is discussed by Shrivastava.

The papers published here on rabies represent the continuation of collaborative efforts between members of the WHO Expert Advisory Panel on Rabies which have been under way for the past ten years. Since the first meeting of the WHO Expert Committee on Rabies in 1950, the major problems of rabies have been systematically investigated. One series of collaborative studies has been on the question of vaccine and serum treatment of individuals exposed to the bite of rabid animals. The object of these studies was both to determine whether it would be possible to reduce the number of vaccine inoculations required and to study the effect of serum administered simultaneously with vaccine. It has already been shown that the addition of serum may be a life-saving measure when applied to individuals exposed to the bite of rabid wolves.[2,3] Two studies on vaccine and serum inoculations in non-exposed persons have also been published.[4,5] The present paper on this subject represents the third of this series by Atanasiu and others, and the results reported confirm previous observations that the administration of serum interferes with the antigenic action of vaccine, and that, in order to overcome this interference, a minimum of 14 inoculations of vaccine is required.

Another study is on the antigenic value of freeze-dried phenolized antirabies vaccine. This type of vaccine was developed in the Soviet Union, and the investigation by Veeraraghavan & Subrahmanyan, of the Pasteur Institute of Southern India, published here confirms the successful results reported by USSR scientists. A freeze-dried phenolized vaccine has the advantage of long retention of potency under difficult climatic conditions such as are encountered in tropical countries. Most rabies vaccines as now

[1] Swaroop, S. (1957) *Bull. Wld Hlth Org.*, **16**, 1083.

[2] Baltazard, M. & Bahmanyar, M. (1955) *Bull. Wld Hlth Org.*, **13**, 747.

[3] Habel, K. & Koprowski, H. (1955) *Bull. Wld Hlth Org.*, **13**, 773.

[4] Atanasiu, P. et al. (1956) *Bull. Wld Hlth Org.*, **14**, 593.

[5] Atanasiu, P. et al. (1957) *Bull. Wld Hlth Org.*, **17**, 911.

prepared must be discarded after a variable period of months because they drop in potency.

The two other rabies studies—by Schindler of the Institute of Tropical Diseases at Hamburg—are on the pathogenesis of the disease and on the action of serum in rabies protection. The findings on pathogenesis give experimental proof of how the rabies virus spreads within the body—a matter incompletely understood hitherto.

Programme Development in the Mental Health Field: Tenth Report of the Expert Committee on Mental Health (*World Health Organization Technical Report Series*, No. 223), Geneva, 1961, 55 pages. Price: 3/6, $0.60, or Sw.fr. 2.—.

This report is reviewed in the article starting on page 383.

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A comparison of the rabbit scarification technique with titrations in cell cultures for the potency assay of smallpox vaccine—*Robert W. Kolb, Ernest C. Cutchins, William P. Jones & Harry T. Aylor*

Cultivation of vaccinia virus in sheep kidney cell cultures—*P. Subramanyam, S. Divakaran & P. Vinodraj*

The use of vaccinia hyperimmune gamma-globulin in the prophylaxis of smallpox—*C. H. Kempe, C. Bowles, G. Meiklejohn, T. O. Berge, L. St. Vincent, B. V. Sundara Babu, S. Govindarajan, N. R. Ratnakannan, A. W. Downie & V. R. Murthy*

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